Start of topic check list for ENZYMES and MEDICAL APPLICATIONS of ENZYMES

Tick as appropriate:

RED: I do not know about this

AMBER: I have heard about this but have not learned this yet. I am unsure on this.

GREEN: I have heard about this and I have learned this. I am confident about this.

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| Topic | RED | AMBER | GREEN |
| 1. The general characteristics of enzymes are due to their biochemical nature as globular proteins, showing specificity, requiring certain conditions and with a mode of action lowering the activation energy of a reaction. |  |  |  |
| 1. The substrate binds to part of the protein called the active site. |  |  |  |
| 1. Understand the action of enzymes explained in relation to enzyme structure - lock and key hypothesis; the theory of induced fit, whereby the specific substrate for the enzyme alters the shape of the active site on binding as illustrated by lysozyme |  |  |  |
| 1. Enzymes are proteins made inside living cells but may act inside the cell (intracellular) or outside (extracellular) such as the digestive enzymes of the alimentary canal. |  |  |  |
| 1. The rate of an enzyme catalysed reaction increases with increasing temperature due to increased frequency of collisions as shown by a graph. |  |  |  |
| 1. The rate of an enzyme catalysed reaction will vary with changes in pH as shown by a graph. |  |  |  |
| 1. The rate of an enzyme catalysed reaction will vary with changes in enzyme concentration as shown by a graph. |  |  |  |
| 1. The rate of an enzyme catalysed reaction will vary with changes in substrate concentration as shown by a graph. |  |  |  |
| 1. Know about the need for buffers in enzyme experiments and the requirement for adequate controls. |  |  |  |
| 1. Environmental conditions such as temperature and pH change the three dimensional structure of enzyme molecules. Bonds are broken and hence the configuration of the active site is altered. |  |  |  |
| 1. High temperatures and extreme changes in pH cause permanent change in protein structure, causing denaturation. |  |  |  |
| 1. Small changes in pH cause small reversible changes in enzyme structure, extreme changes causing inactivation. |  |  |  |
| 1. Inhibition is when enzyme action is slowed down or stopped by another substance. |  |  |  |
| 1. Enzyme inhibition may be competitive whereby an inhibitor, which is structurally similar to the substrate, associates with the enzyme active site. If the substrate concentration is increased so will the rate of reaction. |  |  |  |
| 1. Non competitive inhibition involves an inhibitor combining away from the active site often altering the enzyme shape as illustrated by potassium cyanide. The rate of reaction is unaffected by substrate concentration. |  |  |  |
| 1. Biosensors work because enzymes are specific so they select one type of molecule from a mixture. |  |  |  |
| 1. When a mixture is passed over the enzyme a reaction occurs. The energy released is proportional to the concentration of the substrate and is converted into electrical impulses. Consequently an accurate digital display of concentration is produced e.g. glucose oxidase electrode detects glucose in blood. |  |  |  |
| 1. An enzyme can detect the presence of its substrate even in very low concentrations. |  |  |  |
| 1. The enzyme is immobilised so its structure is stabilised in an inert support e.g. on alginate beads or gel membrane. |  |  |  |
| 1. Industrially an immobilised enzyme can be recovered for re-use. Therefore, a small amount of enzyme may be used to carry out a large-scale reaction. |  |  |  |